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CLAIMS

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1. An apparatus comprising an imaging device, a range finder, and a processor capable of receiving and processing image and range signals to construct a three-dimensional image from said signals.

2. The apparatus according to claim 1, wherein the imaging device comprises a camera.

3. The apparatus according to either preceding claim, wherein the imaging device comprises a digital video camera.

4. The apparatus according to any preceding claim 2, wherein the imaging device is capable of zoom functions.

5. The apparatus according to any preceding claim, wherein the apparatus includes a display device to allow a user to view a target area using the imaging device.

6. The apparatus according to any preceding claim, wherein the apparatus includes a pan and tilt unit for panning and tilting of the range finder and/or imaging device.

7. The apparatus according to claim 6, wherein the pan and tilt unit comprises a first motor for panning of the range finder and/or imaging device, and a second motor for tilting of the range finder and/or imaging device.

8. The apparatus according to claim 7, wherein the

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4 9. The apparatus according to any one of claims 6 to
5 8, wherein the pan and tilt unit includes first and
6 second digital encoders for measuring the angles of pan
7 and tilt respectively.

9 10. The apparatus according to claim 9, wherein the
10 outputs of the first and second encoders are fed to the
11 processor.

13 11. The apparatus according to any preceding claim,
14 wherein the image is digitised.

16 12. The apparatus according to any preceding claim,
17 wherein the image comprises a plurality of pixels.

19 13. The apparatus according to any preceding claim,
20 wherein the image comprises a captured image.

22 14. The apparatus according to any preceding claim,
23 wherein the range finder comprises a laser range
24 finder.

26 15. The apparatus according to any preceding claim,
27 wherein the range finder is bore-sighted with the
28 imaging device.

16. The apparatus according to any preceding claim,
wherein the apparatus includes a compass and an
inclinometer and/or gyroscope.

34 17. The apparatus according to any preceding claim,
35 wherein the apparatus further includes a position
36 fixing system for identifying the geographical position

1 of the apparatus.

2
3 18. The apparatus according to claim 17, wherein the
4 position fixing system is a Global Positioning System
5 (GPS).

6
7 19. The apparatus according to any preceding claim,
8 wherein the apparatus is operated by remote control.

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10 20. The apparatus according to any preceding claim,
11 wherein the apparatus is controlled by an input device.

12
13 21. The apparatus according to claim 20, wherein the
14 input device facilitates operation of a particular
15 function of the apparatus.

16
17 22. A method of generating a three-dimensional image
18 of a target area, the method comprising the steps of
19 providing an imaging device, providing a range finder,
20 operating the imaging device to provide an image of the
21 target area, and subsequently measuring the distance to
22 each of a plurality of points by scanning the range
23 finder at preset intervals relating to the points.

24
25 23. A method according to claim 22, wherein the method
26 includes the further steps of
27 obtaining a focal length of the camera;
28 obtaining a field of view of the camera; and
29 obtaining a principal distance of the camera.

30
31 24. A method according to claim 22 or claim 23,
32 wherein the method includes the further steps of
33 digitising the image to provide a plurality of
34 pixels within the digital image;
35 calculating horizontal and vertical angles between
36 a reference point in the image and each pixel;

1 moving the range finder through the horizontal and
2 vertical angles whereby the range finder is
3 directed at each pixel in sequence; and
4 actuating the range finder to obtain a range to
5 the target corresponding to the position of the
6 pixel.

7
8 25. A method according to claim 24, wherein the method
9 includes the additional steps of
10 assigning x and y coordinates for each pixel
11 within the image;
12 correlating the range to the target with each
13 pixel within the image; and
14 calculating three dimensional coordinates of the
15 pixels to reconstruct a three dimensional image of
16 the target area.

17
18 26. A method according to claim 25, wherein the method
19 includes the additional steps of
20 plotting each of the three dimensional points of
21 the image; and
22 superimposing a wire frame over the image
23 connecting each of the three dimensional points.

24
25 27. A method according to claim 26, wherein the method
26 includes the additional step of superimposing the image
27 on the wire frame to reconstruct a three dimensional
28 image of the target area.

29
30 28. A method according to any one of claims 24 to 27,
31 the method including the further steps of
32 obtaining a horizontal offset and a vertical
33 offset between an axis of the camera and an axis of the
34 range finder;
35 calculating the horizontal and vertical offsets in
36 terms of pixels;

1 calculating the difference between the horizontal
2 and vertical offsets in terms of pixels and the x and y
3 coordinates of the target pixel; and

4 calculating the horizontal and vertical angles.
5

6 29. A method according to any one of claims 24 to 28,
7 wherein the method includes the further steps of

8 providing the range finder and/or camera on a pan
9 and tilt unit;

10 providing angle encoders to measure the angles of
11 pan and tilt of the unit;

12 instructing the pan and tilt unit to pan and tilt
13 the range finder and/or camera through the vertical and
14 horizontal angles;

15 measuring the horizontal and vertical angles using
16 the encoders;

17 verifying that the angles through which the range
18 finder and/or camera are moved is correct;

19 obtaining horizontal and/or vertical correction
20 angles by subtracting the measured horizontal and
21 vertical angles from the calculated horizontal and
22 vertical angles;

23 adjusting the pan and tilt of the range finder
24 and/or camera if necessary; and

25 activating the range finder to obtain the range to
26 the target.
27
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